Claims

1. In an image encoding method for compressing image data representing plural pixels of plural nonzero image tones, the improvement comprising:

designating a current pixel to be encoded and defining a context region that includes multiple context pixels that are adjacent the current pixel, each of the context pixels having an image tone;

quantizing the context region according to a pattern of unique image tones among the context pixels in the context region; and

encoding the current pixel with reference to the quantization of the context region.

2. The method of claim 1 in which the pattern of unique image tones among the context pixels in the context region includes an indication of the number of unique image tones among the context pixels in the context region.

3. The method of claim 1 in which the pattern of unique image tones among the context pixels in the context region includes an indication of a non-local trend within the context pixels.

4. The method of claim 1 in which encoding the current pixel with reference to the quantization of the context region includes adaptive entropy coding the current pixel with reference to the quantization of the context region.

5. An image encoding method for compressing image data representing plural pixels of plural nonzero image tones, comprising:

designating a current pixel to be encoded;

defining a context region that includes multiple context pixels that are adjacent the current pixel, each of the context pixels having an image tone;

identifying a pattern of unique image tones among the context pixels in the context region;

assigning a state to the context region according to the pattern of unique image tones therein; and

adaptive entropy coding the current pixel with reference to the state of the context region.

6. The method of claim 5 further including identifying a non-local trend within the context pixels.

7. The method of claim 6 in which identifying a non-local trend includes identifying non-local trends that are in horizontal or vertical alignment with the current pixel.

8. The method of claim 6 in which identification of each non-local trend references a trend context pixel in addition to the context pixels in which the pattern of unique tones are identified.

9. The method of claim 5 in which the adaptive entropy coding includes arithmetic coding.

10. The method of claim 5 in which the pattern of unique image tones is identified with reference only to context pixels that are immediately adjacent the current pixel.

11. The method of claim 10 further including identifying a non-local trend within the context pixels, identification of each non-local trend referencing a trend context pixel in addition to the context pixels in which the pattern of unique tones are identified.

12. The method of claim 5 in which the pattern of tones is identified with reference to only four context pixels.

13. The method of claim 5 in which the adaptive entropy coding includes arithmetic coding in which the current pixel may be encoded according to a previously encoded pixel having the same tone or as a not-in-

context element corresponding to a tone in a color cache representing an ordered list of most recent not-in-context values.

14. In a computer readable medium, image encoding software for compressing image data representing plural pixels of plural nonzero image tones, comprising:

software for designating a current pixel to be encoded;

software for defining a context region that includes multiple context pixels that are adjacent the current pixel, each of the context pixels having an image tone;

software for identifying a pattern of unique image tones among the context pixels in the context region;

software for assigning a state to the context region according to the pattern of unique image tones therein; and

software for adaptive entropy coding the current pixel with reference to the state of the context region.

15. The medium of claim 14 further including software for identifying a non-local trend within the context pixels.

16. The medium of claim 15 in which the software for identifying a non-local trend includes software for identifying non-local trends that are in horizontal or vertical alignment with the current pixel.

17. The medium of claim 15 in which identification of each non-local trend references a trend context pixel in addition to the context pixels in which the pattern of unique tones are identified.

18. The medium of claim 14 in which the software for adaptive entropy coding includes software for arithmetic coding.

19. The medium of claim 14 in which the pattern of unique image tones is identified with reference only to context pixels that are immediately adjacent the current pixel.

20. The medium of claim 19 further including software for identifying a non-local trend within the context pixels, identification of each non-local trend referencing a trend context pixel in addition to the context pixels in which the pattern of unique tones are identified.

21. The medium of claim 14 in which the pattern of tones is identified with reference to only four context pixels.

22. The medium of claim 14 in which the software for adaptive entropy coding includes software for arithmetic coding in which the current pixel may be encoded according to a previously encoded pixel having the same tone or as a not-in-context element corresponding to a tone in a color cache representing an ordered list of most recent not-in-context values.

23. In a computer readable medium, an image encoding context region data structure used in compressing image data representing a selected pixel out of plural pixels of plural nonzero image tones, comprising:

an basic state context region data structure representing only previously encoded pixels that are immediately adjacent the selected pixel.

24. The medium of claim 23 in which the basic state context region data structure represents a pattern of image tones in the previously encoded pixels that are immediately adjacent the selected pixel.

25. The medium of claim 23 further comprising a trend state context region data structure representing first and second previously encoded pixels that are immediately adjacent pixels represented by the basic state context region data structure.

26. The medium of claim 25 in which the trend state context region data structure represents only first and second previously encoded pixels that are immediately adjacent pixels represented by the basic state context region data structure.

27. The medium of claim 25 in which the trend state context region data structure represents horizontal and vertical trends with respect to the selected pixel.

28. An image encoding method for compressing image data representing plural pixels of plural nonzero image tones, comprising:

designating a current pixel to be encoded;

identifying within a basic context region that includes multiple context pixels that are adjacent the current pixel, each of the context pixels having an image tone, the pattern of unique image tones among the context pixels in the context region;

identifying within an extended context region that includes the basic context region a non-local trend within the context pixels;

assigning a state according to identifications made within the basic and extended context regions; and

adaptive entropy coding the current pixel with reference to the state of the context region.

29. The method of claim 28 in which identifying a non-local trend includes identifying non-local trends that are in horizontal or vertical alignment with the current pixel.

30. The method of claim 28 in which the adaptive entropy coding includes arithmetic coding.

31. The method of claim 28 in which the pattern of unique image tones is identified with reference only to context pixels that are immediately adjacent the current pixel.

32. The method of claim 28 in which the pattern of tones is identified with reference to only four context pixels.

33. The method of claim 28 in which the adaptive entropy coding includes arithmetic coding in which the current pixel may be encoded

according to a previously encoded pixel having the same tone or as a not-in-context element corresponding to a tone in a color cache representing an ordered list of most recent not-in-context values.

34. In a computer readable medium, image encoding software for compressing image data representing plural pixels of plural nonzero image tones, comprising:

software for designating a current pixel to be encoded;

software for identifying within a basic context region that includes multiple context pixels that are adjacent the current pixel, each of the context pixels having an image tone, a pattern of unique image tones among the context pixels in the context region;

software for identifying within an extended context region that includes the basic context region a non-local trend within the context pixels;

software for assigning a state according to identifications made within the basic and extended context regions; and

software for adaptive entropy coding the current pixel with reference to the state of the context region.

35. The medium of claim 34 in which the software for identifying a non-local trend includes software for identifying non-local trends that are in horizontal or vertical alignment with the current pixel.

36. The medium of claim 34 in which the software for adaptive entropy coding includes software for arithmetic coding.

37. The medium of claim 34 in which the pattern of unique image tones is identified with reference only to context pixels that are immediately adjacent the current pixel.

38. The medium of claim 34 in which the pattern of tones is identified with reference to only four context pixels.

39. The medium of claim 34 in which the software for adaptive entropy coding includes software for arithmetic coding in which the current pixel may be encoded according to a previously encoded pixel having the same tone or as a not-in-context element corresponding to a tone in a color cache representing an ordered list of most recent not-in-context values.